

**Utah Division of Water Quality
Statement of Basis
ADDENDUM
Wasteload Analysis and Antidegradation Level I Review**

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Facility: Lila Canyon Mine
UPDES No. UT0026018

Receiving water: Lila Canyon Wash (2B, 3C, 4)

This addendum summarizes the wasteload analysis that was performed to determine water quality based effluent limits (WQBEL) for this discharge. Wasteload analyses are performed to determine point source effluent limitations necessary to maintain designated beneficial uses by evaluating projected effects of discharge concentrations on in-stream water quality. The wasteload analysis also takes into account downstream designated uses (UAC R317-2-8). Projected concentrations are compared to numeric water quality standards to determine acceptability. The numeric criteria in this wasteload analysis may be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

Discharge

Outfall 001: Sanitary package plant discharge, 0.00875 MGD maximum daily design discharge and 0.004375 MGD maximum monthly design discharge for the treatment plant
Outfall 002: Mine water discharge, 3 MGD maximum monthly discharge
Outfall 003: Sediment pond discharge

Receiving Water

The receiving waters for the outfalls are Lila Canyon Wash → Grassy Wash → Marsh Flats Wash → Price River → Green River.

Per UAC R317-2-13.1b, the beneficial uses for Price River and tributaries, from confluence with Green River to Carbon Canal Diversion at Price City Golf Course are 2B, 3C and 4.

- *Class 2B - Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.*
- *Class 3C - Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain.*
- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering.*

Typically, the critical flow for the wasteload analysis is considered the lowest average flow for seven consecutive days with a ten year return frequency (7Q10). Lila Canyon Wash is an

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ephemeral dry wash which only has flow during rain events; therefore, there is no flow during critical conditions.

Impaired Waters and TMDL

The receiving water and Price River downstream are not listed as impaired for any parameters according to the 303(d) list in *Utah's 2016 Integrated Report*.

The Price River and tributaries from confluence with Green River to confluence with Soldier Creek has a site specific standard for TDS of 3,000 mg/l.

Mixing Zone

The maximum allowable mixing zone is 15 minutes of travel time for acute conditions, not to exceed 50% of stream width, and 2,500 feet for chronic conditions, per UAC R317-2-5. Water quality standards must be met at the end of the mixing zone. Due to the lack of dilution in Lila Canyon Wash during critical conditions, no mixing zone is allowed.

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were total suspended solids (TSS), dissolved oxygen (DO), BOD₅, total ammonia (TAN), E. coli, and pH as determined in consultation with the UPDES Permit Writer.

Wasteload Allocation Methods

Effluent limits were determined using a mass balance mixing analysis (UDWQ 2012). The mass balance analysis is summarized in Appendix A. Some of the dissolved metals standards and resulting total recoverable metals effluent limits are dependent on the hardness of the effluent. Based on hardness data submitted in the permit application, the hardness of the mine water was well above 400 mg/L; therefore, the hardness was assumed to be 400 mg/L (as CaCO₃).

The water quality standard for chronic ammonia toxicity is dependent on temperature and pH, and the water quality standard for acute ammonia toxicity is dependent on pH. The water quality standards for ammonia are summarized in Appendix B. Based on other installations of the proposed treatment system in Utah, the design engineer projected the pH of the effluent will range from 6.8 to 7.5 and the temperature from 10 to 15.5 degrees Celsius. Fish early life stages were assumed absent in the receiving waters.

Since the receiving water is an ephemeral wash and not a perennial stream, the effects of TP, TN, DO and BOD₅ in the effluent on the DO in the downstream receiving waters was not assessed. It is presumed that secondary standards for BOD₅ and water quality criteria for DO are sufficiently protective of the receiving water.

WET Limits

The percent of effluent in the receiving water in a fully mixed condition, and acute and chronic dilution in a not fully mixed condition are calculated in the WLA in order to generate WET limits. The LC₅₀ (lethal concentration, 50%) percent effluent for acute toxicity and the IC₂₅ (inhibition concentration, 25%) percent effluent for chronic toxicity, as determined by the WET

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test, needs to be below the WET limits, as determined by the WLA. The WET limit for LC₅₀ is typically 100% effluent and does not need to be determined by the WLA.

Table 1: WET Limits for IC₂₅

Season	Percent Effluent
Annual	100%

Effluent Limits

The water quality based effluent limits for selected constituents are listed in Table 2. The complete list of effluent limits is attached in the appendices.

Table 2: Water Quality Based Effluent Limits for Selected Constituents

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Flow (MGD) – Outfall 001		0.00875	1 day		0.004375	30 days
Flow (MGD) – Outfall 002					3.0	30 days
Dissolved Oxygen, Min. (mg/L)	3.0	3.0	Minimum	5.0	5.0	30 days
Ammonia (mg/L)	Varies		1 hour	Varies		30 days
Summer (Jul-Sep)		8.4			4.1	
Fall (Oct-Dec)		8.4			5.1	
Winter (Jan-Mar)		8.4			5.8	
Spring (Apr-Jun)		8.4			5.1	

Models and supporting documentation are available for review upon request.

Antidegradation Level I Review

The objective of the Level I ADR is to ensure the protection of existing uses, defined as the beneficial uses attained in the receiving water on or after November 28, 1975. No evidence is known that the existing uses deviate from the designated beneficial uses for the receiving water. Therefore, the beneficial uses will be protected if the discharge remains below the WQBELs presented in this wasteload.

A Level II Antidegradation Review (ADR) is required for Outfall 002 since the pollutant load will increase under this permit.

Documents:

WLA Document: *LilaCanyonMineWLA_2020-08-05.docx*

Wasteload Analysis: *LilaCanyonMineWLA_2020.xlsm*

References:

Utah Division of Water Quality. 2012. *Utah Wasteload Analysis Procedures Version 1.0.*

Utah Division of Water Quality. 2016. *Utah's 2016 Integrated Report.*

WASTELOAD ANALYSIS [WLA]

Date: 8/5/2020

Appendix A: Mass Balance Mixing Analysis for Conservative Constituents

Discharging Facility: Lila Canyon Mine
 UPDES No: UT-0026018
 Outfalls: 001, 002, 003

Receiving Water: Lila Canyon Wash
 Stream Classification: 2B, 3C, 4
 Stream Flows [cfs]: 0.0 All Seasons Critical Low Flow

Fully Mixed: YES
 Acute River Width: 100%
 Chronic River Width: 100%

Modeling Information

A mass balance mixing analysis was used to determine the effluent limits.

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

Effluent Limitations

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

Effluent Limitations for Protection of Recreation (Class 2B Waters)

Physical Parameter	Concentration	
	Minimum	Maximum
pH	6.5	9.0
Turbidity Increase (NTU)		10.0

Bacteriological

E. coli (30 Day Geometric Mean)	206 (#/100 mL)
E. coli (Maximum)	668 (#/100 mL)

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Effluent Limitations for Protection of Aquatic Wildlife (Class 3C Waters)

Physical Parameter	Concentration	
	Minimum	Maximum
pH	6.5	9.0
Turbidity Increase (NTU)		15.0

Temperature (deg C)	Maximum
Instantaneous	27.0
Change	4.0

Dissolved Oxygen (mg/L)	Minimum Concentration
Instantaneous	3.0
30-day Average	5.0

Inorganics Parameter	Chronic (30-day ave)		Acute Standard (1 Hour Average)	
	Standard	Limit	Standard	Limit
Phenol (mg/L)			0.010	0.010
Hydrogen Sulfide (Undissociated) [mg/L]			0.002	0.002
Total Residual Chlorine (mg/L)	0.011	0.011	0.019	0.019

Ammonia-Total (mg/L)	Season	Chronic (30-day ave)		Acute (1-hour ave)	
		Standard	Limit	Standard	Limit
	Summer	4.1	4.1	8.4	8.4
	Fall	5.1	5.1	8.4	8.4
	Winter	5.8	5.8	8.4	8.4
	Spring	5.1	5.1	8.4	8.4

Metals-Total Recoverable Parameter	Chronic (4-day ave)		Acute (1-hour ave)	
	Standard ¹	Limit	Standard ¹	Limit
Aluminum (µg/L)	87.0	N/A	750	750
Arsenic (µg/L)	150	150	340	340
Cadmium (µg/L)	0.6	0.6	7.7	7.7
Chromium VI (µg/L)	11.0	11.0	16.0	16.0
Chromium III (µg/L)	231	231	1,773	1,773
Copper (µg/L)	29.3	29.3	49.6	49.6
Cyanide (µg/L) ²	5.2	5.2	22.0	22.0
Iron (µg/L)			1,000	1,000
Lead (µg/L)	10.9	10.9	281	281
Mercury (µg/L) ²	0.012	0.012	2.4	2.4
Nickel (µg/L)	168	168	1,513	1,513
Selenium (µg/L)	4.6	4.6	18.4	18.4
Silver (µg/L)			34.9	34.9
Tributyltin (µg/L) ²	0.072	0.072	0.46	0.46
Zinc (µg/L)	382	382	379	379

1: Based upon a Hardness of 400 mg/l as CaCO3

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Organics [Pesticides]	Parameter	Chronic (4-day ave)		Acute (1-hour ave)	
		Standard	Limit	Standard	Limit
	Aldrin (µg/L)			1.5	1.5
	Chlordane (µg/L)	0.0043	0.0043	1.2	1.2
	DDT, DDE (µg/L)	0.001	0.001	0.55	0.55
	Diazinon (µg/L)	0.17	0.17	0.17	0.17
	Dieldrin (µg/L)	0.0056	0.0056	0.24	0.24
	Endosulfan, a & b (µg/L)	0.056	0.056	0.11	0.11
	Endrin (µg/L)	0.036	0.036	0.086	0.086
	Heptachlor & H. epoxide (µg/L)	0.0038	0.0038	0.26	0.26
	Lindane (µg/L)	0.08	0.08	1.0	1.0
	Methoxychlor (µg/L)			0.03	0.03
	Mirex (µg/L)			0.001	0.001
	Nonylphenol (µg/L)	6.6	6.6	28.0	28.0
	Parathion (µg/L)	0.0130	0.0130	0.066	0.066
	PCB's (µg/L)	0.014	0.014		
	Pentachlorophenol (µg/L)	15.0	15.0	19.0	19.0
	Toxephene (µg/L)	0.0002	0.0002	0.73	0.73

Radiological	Parameter	Maximum Concentration	
		Standard	Limit
	Gross Alpha (pCi/L)	15	15.0

Effluent Limitation for Protection of Agriculture (Class 4 Waters)

Parameter	Maximum Concentration	
	Standard	Limit
Total Dissolved Solids (mg/L)	3000	3000 Site specific standard
Boron (mg/L)	0.75	0.8
Arsenic, Dissolved (µg/L)	100	100
Cadmium, Dissolved (µg/L)	10	10.0
Chromium, Dissolved (µg/L)	100	100
Copper, Dissolved (µg/L)	200	200
Lead, Dissolved (µg/L)	100	100
Selenium, Dissolved (µg/L)	50	50
Gross Alpha (pCi/L)	15	15.0

Freshwater total ammonia criteria based on Title R317-2-14 Utah Administrative Code
 Acute

INPUT

	Summer	Fall	Winter	Spring
pH:	8.00	8.00	8.00	8.00
Beneficial use classification:	3C	3C	3C	3C

OUTPUT

	Summer	Fall	Winter	Spring
Acute:	Total ammonia nitrogen criteria (mg N/L):			
	8.408	8.408	8.408	8.408

Freshwater total ammonia criteria based on Title R317-2-14 Utah Administrative Code
Chronic

INPUT

	Summer	Fall	Winter	Spring
Temperature (deg C):	15.5	12.0	10.0	12.0
pH:	7.50	7.50	7.50	7.50
Are fish early life stages present?	No	No	No	No

OUTPUT

Total ammonia nitrogen criteria (mg N/L):				
Chronic - Fish Early Life Stages Present:	4.096	4.364	4.364	4.364
Chronic - Fish Early Life Stages Absent:	4.096	5.133	5.840	5.133